

Atty. Docket No. IDR0020
Application No: 10/789,317

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Amendments to the Claims

Please cancel claims 6 and 39-73, add new claims 74-111, and amend the remaining claims as follows:

Listing of Claims

1. (Currently amended) A method of making a hydrogenated Group IVA compound, comprising the steps of:

- a) reacting one or more reducible Group IVA compounds with a metal hydride to form a metal-contaminated, hydrogenated Group IVA compound, said metal-contaminated, hydrogenated Group IVA compound consisting essentially of (i) Si and/or Ge, and (ii) hydrogen; and
- b) washing said metal-contaminated, hydrogenated Group IVA compound with a washing composition comprising ~~an immiscible polar solvent~~ deionized water to decontaminate said metal-contaminated, hydrogenated Group IVA compound.

2. (Original) The method of Claim 1, wherein said reducible Group IVA compounds comprise one or more compound(s) of the formula A_xX_y , where each A is independently Si or Ge, each X is independently a halogen, x is from 3 to 12, and y is from x to $(2x+2)$.

3. (Original) The method of Claim 1, wherein said metal-contaminated, hydrogenated Group IVA compound is washed with the washing composition sufficiently to remove a substantial amount of metal contaminants.

4. (Currently amended) The method of Claim 1, wherein said metal hydride comprises a compound of the formula $M^1_nM^2_mH_cR_d$, where M^1 and M^2 are independently first and second metals, each R in said ~~second compound-metal hydride~~ is independently a ligand bound to at least one of M^1 and M^2 by a covalent, ionic or coordination bond, at least one of a

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and b is at least 1, c is at least 1, and d is 0 or any integer up to one less than the number of ligand binding sites available on the (a + b) instances of M^1 and M^2 .

5. (Original) The method of Claim 4, wherein said washing step is conducted sufficiently to remove a substantial amount of said first and/or second metals.

6. (Cancelled)

7. (Currently amended) The method of Claim ~~6~~1, wherein said washing composition consists essentially of deionized water.

8. (Currently amended) The method of Claim 1, wherein said ~~polar~~ washing composition comprises dilute aqueous acid.

9. (Currently amended) The method of Claim 8, wherein said ~~dilute acid~~ washing composition has a pH of from 1 to less than 7.

10. (Currently amended) The method of Claim 8, wherein said ~~dilute acid~~ washing composition is selected from the group consisting of dilute aqueous HCl, dilute aqueous HBr, and dilute aqueous HI.

11. (Currently amended) The method of Claim 1, wherein said washing composition comprises a buffered aqueous acid.

12. (Currently amended) The method of Claim 11, wherein said buffered aqueous acid comprises dilute aqueous acetic acid buffered with ammonium acetate.

13. (Original) The method of Claim 1, wherein said washing composition and said metal-contaminated Group IVA compound are present in a volume ratio of from 10:1 to 1:10.

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14. (Original) The method of Claim 13, wherein said volume ratio is from 5:1 to 1:5.
15. (Original) The method of Claim 1, wherein said hydrogenated Group IVA compound comprises of a cyclic Group IVA compound of the formula $(AH_z)_n$, where n is from 3 to 12, and each of the n instances of z is independently 1 or 2.
16. (Original) The method of Claim 15, wherein A is Si, n is from 5 to 8, and z is 2.
17. (Original) The method of Claim 2, wherein X is Cl.
18. (Original) The method of Claim 4, wherein d is 0.
19. (Original) The method of Claim 18, wherein M^1 comprises an alkali or alkaline earth metal, M^2 comprises a member selected from the group consisting of transition metals and Group IIIA elements, and a and b are each an integer of at least one.
20. (Original) The method of Claim 19, wherein M^2 comprises aluminum.
21. (Original) The method of Claim 4, wherein M^2 comprises a member selected from the group consisting of transition metals and Group IIIA elements, a is 0 or 1, d is at least 1, and each R is independently a member selected from the group consisting of an alkyl group, an alkoxy group, an alkoxyalkylene group, an alkoxyalkyleneoxy group, and a cyano group.
22. (Original) The method of Claim 21, wherein a is 0.
23. (Original) The method of Claim 22, wherein M^2 comprises aluminum, R is a C_1 - C_6 alkyl group, and c and d are integers having a ratio of from 1:2 to 2:1.

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24. (Original) The method of Claim 4, wherein M^2 comprises aluminum.

25. (Original) The method of Claim 24, wherein a is 1; M^1 comprises an alkali metal; each R is independently a C_1 - C_6 alkyl group, a C_1 - C_6 alkoxy group, a C_1 - C_4 alkyl- C_1 - C_6 alkylene group, a C_1 - C_4 alkoxy- C_1 - C_6 alkylene group or a C_1 - C_4 alkoxy- C_1 - C_6 alkyleneoxy group; and c and d are integers having a ratio of from 1:3 to 3:1.

26. (Currently amended) The method of Claim ~~[[1]]~~ 4, wherein after said washing step, said first and second metals are present in a concentration or amount of less than 100 parts per million Group IVA atoms in said hydrogenated Group IVA compound.

27. (Original) The method of Claim 26, wherein after said washing step, said first and second metals are present in an amount of less than 10 parts per million Group IVA atoms in said hydrogenated Group IVA compound.

28. (Original) The method of Claim 27, wherein after said washing step, said first and second metals are present in an amount of less than 1 part per million Group IVA atoms in said hydrogenated Group IVA compound.

29. (Currently amended) The method of Claim 2, further comprising the step of reacting a compound of the formula A_xR_y with HX and a Lewis acid to form said compound of the formula A_xX_y , wherein ~~X is a halogen~~ x' is from 3 to 12, y' is from x' to $(2x' + 2)$, and R is an alkyl group or an aryl group which may be substituted with alkyl, alkoxy, aryl, aralkyl, halogen and/or nitro groups.

30. (Original) The method of Claim 29, wherein R comprises a phenyl group.

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31. (Original) The method of Claim 29, wherein said Lewis acid comprises a compound of the formula $M^3_pX_q$, where M^3 comprises a member selected from the group consisting of transition metals and Group IIIA elements, p is 1 or 2, and q is any integer up to the number of ligand binding sites available on the p instances of M^3 .

32. (Original) The method of Claim 31, wherein M^3 comprises Al, and X comprises Cl or Br.

33. (Currently amended) The method of Claim 29, further comprising the step of reacting a ~~seventh~~ compound of the formula $A_uR_vX_w$ with a reducing agent to form said compound of the formula A_xR_y , wherein x' is from 3 to 12, y' is from x' to $(2x' + 2)$, u is at least 1, v is at least 1, and w is any integer up to $(2u + 2 - v)$.

34. (Original) The method of Claim 33, wherein A is Si, u is 1, v is 1 or 2, and w is $(4 - v)$.

35. (Original) The method of Claim 33, wherein R comprises a phenyl group.

36. (Original) The method of Claim 33, wherein said reducing agent comprises an alkali metal.

37. (Original) The method of Claim 1, further comprising the step of drying said hydrogenated Group IVA compound.

38. (Original) The method of Claim 1, further comprising the step of distilling said hydrogenated Group IVA compound.

39-73. (Cancelled)

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74. (New) A method of making a hydrogenated Group IVA compound, comprising the steps of:

- a) reacting one or more reducible Group IVA compound(s) with a metal hydride to form a metal-contaminated, hydrogenated Group IVA compound, said metal-contaminated, hydrogenated Group IVA compound consisting essentially of (i) Si and/or Ge, and (ii) hydrogen;
- b) washing said metal-contaminated, hydrogenated Group IVA compound with a washing composition comprising an immiscible polar solvent to decontaminate said metal-contaminated, hydrogenated Group IVA compound; and
- c) separating said washing composition containing metal contaminants from said hydrogenated Group IVA compound.

75. (New) The method of Claim 74, wherein said one or more reducible Group IVA compound(s) comprise one or more compound(s) of the formula A_xX_y , where each A is independently Si or Ge, each X is independently a halogen, x is from 3 to 12, and y is from x to $(2x+2)$.

76. (New) The method of Claim 74, wherein said metal-contaminated, hydrogenated Group IVA compound is washed with said washing composition sufficiently to remove a substantial amount of metal contaminants.

77. (New) The method of Claim 74, wherein said metal hydride comprises a compound of the formula $M^1_aM^2_bH_cR_d$, where M^1 and M^2 are independently first and second metals, each R in said metal hydride is independently a ligand bound to at least one of M^1 and M^2 by a covalent, ionic or coordination bond, at least one of a and b is at least 1, c is at least 1,

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and d is 0 or any integer up to one less than the number of ligand binding sites available on the (a + b) instances of M^1 and M^2 .

78. (New) The method of Claim 77, wherein said washing step is conducted sufficiently to remove a substantial amount of said first and/or second metals.

79. (New) The method of Claim 74, wherein said washing composition consists essentially of said polar, immiscible solvent.

80. (New) The method of Claim 74, wherein said washing composition consists essentially of deionized water.

81. (New) The method of Claim 74, wherein said washing composition comprises dilute aqueous acid.

82. (New) The method of Claim 81, wherein said washing composition has a pH of from 1 to less than 7.

83. (New) The method of Claim 81, wherein said washing composition is selected from the group consisting of dilute aqueous HCl, dilute aqueous HBr, dilute aqueous HI, and dilute aqueous acetic acid.

84. (New) The method of Claim 74, wherein said washing composition comprises a buffered aqueous acid.

85. (New) The method of Claim 83, wherein said washing composition further comprises a mixture of a dilute aqueous acid and an acid salt, said acid salt comprising a compound of the formula $M^4_aX_b$, wherein each instance of M^4 is independently a member selected from the group consisting of alkali metals, alkaline earth metals, and ammonium ion, X

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is selected from the group consisting of halogens, phosphate, oxalate, tartrate, and acetate, a is 1 or 2, and b is any integer up to the number of ligand binding sites available on the a instances of M^4 .

86. (New) The method of Claim 74, wherein said washing composition and said metal-contaminated, hydrogenated Group IVA compound are present in a volume ratio of from 10:1 to 1:10.

87. (New) The method of Claim 74, wherein said hydrogenated Group IVA compound comprises a cyclic Group IVA compound of the formula $(AH_z)_n$, where n is from 3 to 12, and each of the n instances of z is independently 1 or 2.

88. (New) The method of Claim 87, wherein A is Si, n is from 5 to 8, and z is 2.

89. (New) The method of Claim 75, wherein X is Cl.

90. (New) The method of Claim 77, wherein d is 0.

91. (New) The method of Claim 90, wherein M^1 comprises an alkali or alkaline earth metal, M^2 comprises a member selected from the group consisting of transition metals and Group IIIA elements, and a and b are each an integer of at least one.

92. (New) The method of Claim 91, wherein M^2 comprises aluminum.

93. (New) The method of Claim 77, wherein M^2 comprises a member selected from the group consisting of transition metals and Group IIIA elements, a is 0 or 1, d is at least 1, and each R is independently a member selected from the group consisting of an alkyl group, an alkoxy group, an alkoxyalkylene group, an alkoxyalkyleneoxy group, and a cyano group.

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94. (New) The method of Claim 77, wherein a is 0.

95. (New) The method of Claim 77, wherein M^2 comprises aluminum, R is a C_1 - C_6 alkyl group, and c and d are integers having a ratio of from 1:2 to 2:1.

96. (New) The method of Claim 77, wherein M^2 comprises aluminum.

97. (New) The method of Claim 96, wherein a is 1; M^1 comprises an alkali metal; each R is independently a C_1 - C_6 alkyl group, a C_1 - C_6 alkoxy group, a C_1 - C_4 alkyl- C_1 - C_6 alkylene group, a C_1 - C_4 alkoxy- C_1 - C_6 alkylene group or a C_1 - C_4 alkoxy- C_1 - C_6 alkyleneoxy group; and c and d are integers having a ratio of from 1:3 to 3:1.

98. (New) The method of Claim 97, wherein after said washing step, said first and second metals are present in a concentration of less than 100 parts per million Group IVA atoms in said hydrogenated Group IVA compound.

99. (New) The method of Claim 98, wherein after said washing step, said first and second metals are present in a concentration of less than 10 parts per million Group IVA atoms in said hydrogenated Group IVA compound.

100. (New) The method of Claim 99, wherein after said washing step, said first and second metals are present in a concentration of less than 1 part per million Group IVA atoms in said hydrogenated Group IVA compound.

101. (New) The method of Claim 75, further comprising the step of reacting a compound of the formula A_xR_y with HX and a Lewis acid to form said compound of the formula A_xX_y , wherein x' is from 3 to 12, y' is from x' to $(2x' + 2)$, and R is an alkyl group or an

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aryl group which may be substituted with alkyl, alkoxy, aryl, aralkyl, halogen and/or nitro groups.

102. (New) The method of Claim 101, wherein R comprises a phenyl group.

103. (New) The method of Claim 102, wherein said Lewis acid comprises a compound of the formula $M^3_pX_q$, where M^3 comprises a member selected from the group consisting of transition metals and Group IIIA elements, p is 1 or 2, and q is any integer up to the number of ligand binding sites available on the p instances of M^3 .

104. (New) The method of Claim 103, wherein M^3 comprises Al, and X comprises Cl or Br.

105. (New) The method of Claim 101, further comprising the step of reacting a compound of the formula $A_uR_vX_w$ with a reducing agent to form said compound of the formula A_xR_y , wherein x' is from 3 to 12, y' is from x' to $(2x' + 2)$, u is at least 1, v is at least 1, and w is any integer up to $(2u + 2 - v)$.

106. (New) The method of Claim 105, wherein A is Si, u is 1, v is 1 or 2, and w is $(4 - v)$.

107. (New) The method of Claim 105, wherein R comprises a phenyl group.

108. (New) The method of Claim 105, wherein said reducing agent comprises an alkali metal.

109. (New) The method of Claim 74, further comprising the step of drying said hydrogenated Group IVA compound.

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110. (New) The method of Claim 74, further comprising the step of distilling said hydrogenated Group IVA compound.

111. (New) The method of Claim 74, wherein separating said washing composition containing metal contaminants comprises decanting said washing composition containing metal contaminants from said hydrogenated Group IVA compound.